REMARKS

This paper is presented in response to a non-final Office action dated June 26, 2008. By the foregoing amendments, claims 1-3 and 9 have been amended for clarity, and claims 7 and 8 have been amended to correct dependencies. New claim 10 is presented, and is directed to a method wherein the heated vessel contents consist only of the powder particles and the sulfur. New claim 11 is presented, and is directed to the powder particles produced by the method of claim 1. No new matter has been added.

Claims 1-9 stand rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 7,019,208 B2 to Delahoy. The rejection is traversed.

To anticipate under § 102, each element of the claim must be found (explicitly or inherently) in the single prior art reference applied. The Delahoy patent does not disclose a method of treating powder particles of $Cu(In,Ga)Se_2$. Accordingly, the claims are in compliance with § 102, and the rejection must be withdrawn. Such action is solicited.

Delahoy describes a method for surface treatment of a CIGS ($Cu(In,Ga)Se_2$) compound as a substrate, with ZIS ($ZnIn_2Se_4$) in the presence of sulfur, leading to layer formation of ZISS ($ZnIn_2(Se_{1-x}, S_x)_4$, which works as a buffer material on the CIGS substrate (column 4, line 41, and column 3, lines 32-34). CIGS is used in the Delahoy process in the form of a cohesive layer, formed on a glass substrate (see the Example, column 9, lines 50 forward). The ZISS layer formation itself is carried out by evaporating a mixture of ZIS and sulfur or ZIS and sulfur separately in a vessel followed by deposition on the CIGS substrate (see column 5, lines 48-50).

Delahoy fails to disclose a process in which powder particles of CIGS are treated with sulfur. New claim 10 is further distinguished in that Delahoy fails to disclose a process in which powder particles of CIGS are treated only with sulfur. In contrast, Delahoy describes surface treatment of a CIGS cohesive layer with ZISS, using a treatment method with ZIS and sulfur.

Regarding new claim 10, since ZIS and sulfur are used together in the Delahoy reference, CIGS always reacts both with ZIS and sulfur. At best, it is submitted that a reaction of CIGS with sulfur thus only occurs as a side reaction at the very beginning of the coating procedure, before CIGS is at least partially covered by ZIS/ZISS, which will automatically prevent any possible further reaction between CIGS and sulfur (see column 8, lines 60-66 of Delahoy). This leads to a material in which at best only the upper surface layer of a CIGS layer has possible contact with sulfur.

The method according to the claims leads to another product, which is now recited in claim 11. According to the method of claim 1, CIGS is used in the form of powder particles and these particles are intensively exposed to sulfur. These differences lead to a different product in comparison to Delahoy. In particular, the exposition of powder particles according to the invention is thus already intrinsically more intense because, by nature, they provide a high surface area and thus lead to a much higher sulfur exposure of the CIGS material in comparison to a simple CIGS layer.

Claim 10 is further distinguished because pure sulfur exposure in the method according to Delahoy is intrinsically very short, namely at just the beginning of the procedure before ZIS/ZISS deposition. The method according to the present invention thereby prefers a longer sulphur exposure time of the CIGS powder substrate to yield particles with higher photovoltaic capabilities. This cannot be achieved by the process described by Delahoy due to the reasons just mentioned.

In contrast to Delahoy, the present inventors have realized that the preferred treatment of CIGS powder particles, which have a high surface area, and preferably treated only with sulfur, leads to the surprising effect that solar cells in which the treated powder is used have a much higher efficiency factor than solar cells in which a powder is used that was not treated by the claimed method. This is disclosed in paragraph [0007] of the present application as published under no. US 2007-0113888 A1 (May 24, 2007). This effect occurs if CIGS is present as high surface area material, *i.e.* in the form of fine particles like powder particles, which are exposed to a sulfur containing atmosphere for a long period of time. Delahoy neither discloses such a high surface area material, nor does Delahoy propose to transfer the described process to powder particles. In addition, the process of Delahoy also cannot lead to the highly photovoltaic active particles according to the current invention because of the exposure to both ZIS and sulfur, whereby actual exposure to sulfur is extremely short due to immediate deposition of ZIS/formation of ZISS.

A person of ordinary skill in the art would have no motivation for modifying the teaching of Delahoy to arrive at the current invention, because the focus of Delahoy is the production of an effective ZIS-type buffer layer (see column 3, lines 49-52) and not the modification of the CIGS substrate itself.

Furthermore, it is explicitly described in Delahoy that ZIS/ZISS materials can alternatively be sputtered (see column 5, lines 20-35) onto a CIGS target; however this only makes sense if a bulk material is used as a target, like the cohesive CIGS films (on glass) as described in the example. There is no indication in Delahoy that the substrate could be

anything other than the cohesive CIGS films, and in the context of Delahoy sputtering on a powder target does not make sense. Thus, Delahoy's teaching of the alternative method of sputtering teaches away from the current invention of using CIGS in the form of powder particles.

In conclusion, Delahoy does not anticipate the present invention, because it does not teach a method as claimed treating powder particles of CIGS. Furthermore, a person of ordinary skill in the art would not be motivated by the technical teaching of Delahoy to apply the method described therein on CIGS powder particles. Because the method and particles produced by the claimed method are not described by or obvious in view of Delahoy, the mono-particle membrane solar cell according to claim 9 is also patentable.

CONCLUSION

In view of the foregoing, entry of amendments to the claims, and entry of new claims 10 and 11 are respectfully requested.

In the absence of more pertinent prior art, withdrawal of the rejections and allowance of all pending claims 1-11 are respectfully requested.

Should the examiner wish to discuss the foregoing, or any matter of form or procedure in an effort to advance this application to allowance, the examiner is urged to telephone the undersigned attorney at the indicated number.

Respectfully submitted,

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